

## ACOUSTIC TRANSMISSION USING DIGITAL MOBILE PHONES

The present invention relates to the field of monitoring a cardiac patient's electrical cardiac activity at a central location by means of an apparatus associated with a digital mobile phone handset and transmitting the information over the digital mobile phone/ telephone  
5 network.

### BACKGROUND TO THE INVENTION

Cardiac event recorders use acoustic transmission of recorded signals via telephone systems. An ECG signal is frequency modulated in the audio band of the conventional telephone line. Digital mobile telephones use special filtering techniques in order to reduce  
10 the amount of transmitted data. The filtering algorithm used can recognise a non-voice sound and suppress it. Therefore, frequency modulated ECG signals are treated by the digital mobile telephone system as a single frequency unwanted noise.

It would be advantageous to provide a method of transmitting frequency modulated ECG signals via a digital mobile phone network as this would greatly enhance the ability of a  
15 cardiac patient to be diagnosed remote from the health professionals.

### OBJECT OF THE INVENTION

It is an object of the present invention to provide a method and apparatus when monitoring cardiac activity, to transmit frequency modulated signals over a digital mobile phone  
network.

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### DISCLOSURE OF THE INVENTION

According to one aspect of the present invention there is disclosed a method of transmitting frequency modulated data signals over a digital mobile phone network which filters the transmitted data signals, said method comprising the step of providing original said frequency modulated data signals with more than one frequency.

25 Preferably the frequency modulated data signals having more than one frequency are modulated in amplitude as well.

In one form of the invention, the frequency modulated data signals having more than one frequency is achieved by generating a pseudo random sequence which does not overlap the frequency band of the FM data signals and mixing the sequence with the original data frequency modulated signals.

- 5 Preferably, the pseudo random sequence has a lower frequency band than that of the original data frequency modulated signals.

### BRIEF DESCRIPTION OF THE DRAWINGS

The present invention will be now be described with reference to the accompanying drawing in which:

- 10 Fig. 1 is a diagram showing the relative frequency bands of the mixed signals in accordance with the preferred embodiment of the present invention; and

Fig. 2 is a schematic block diagram of the circuitry used in the preferred embodiment of the present invention.

### BEST MODE OF CARRYING OUT THE INVENTION

- 15 A mixing circuit 10 is illustrated in Fig. 2. The circuit 10 includes a CPU 11 with a push-pull speaker driver 12. The CPU 11 generates frequency modulated data signals FM ECG 1 and FM ECG 2 as well as a pseudo random sequence PRS having frequency bands as illustrated in Fig. 1.

- Resistor R1 of the push-pull speaker driver 12 limits the current form the output of the CPU  
20 11 while the PRS signal is also applied to the speaker via the resistor R2. The signals FM ECG 1 and PRS are mixed at the speaker which allows for the amplitude modulation of the FM ECG 1 - FM ECG 2 signal by the lower frequency PRS signal.

The foregoing describes only one embodiment of the present invention, and modifications obvious to those skilled in the art can be made thereto without departing from the scope of the present invention.